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# STAR PARTS

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## QUADDER MAINTENANCE MANUAL .

### STAR PARTS Co.

SOUTH HACKENSACK, N. J.

A division of

POWERS & EATON *Industries, Inc.*



# MAINTENANCE MANUAL

## STAR SELECTRO-MATIC QUADDER (MODEL F)

### GUARANTEE

All electrical parts of the Selectro-Matic Quadder are guaranteed against defects for a period of ninety days; mechanical parts for one year.

Any part deemed defective should be reported or returned to the factory at South Hackensack for adjustment.

### COMMUNICATIONS

When writing to the factory regarding your Star Quadder, please include serial number, and refer to parts by catalog number wherever possible. As an alternative, parts may be identified by the figure numbers used in this manual.



**STAR PARTS Co.**  
SOUTH HACKENSACK, NEW JERSEY

A DIVISION OF POWERS & SEATON *Industrial Sales, Inc.*  
CHICAGO • DENVER • KANSAS CITY, MO. • LOS ANGELES • MINNEAPOLIS • MONTREAL

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The first three sections should be read IMMEDIATELY by the person to whom is entrusted the care of the Selectro-Matic Quadder. The remaining sections should be read through as soon as opportunity permits so that you may have a general idea of the contents. The solutions to specific problems are covered in detail in the Trouble-Shooting section beginning on page 15.

**THE SELECTRO-MATIC  
MEMORY SYSTEM**

HYDRAULIC & SWITCH  
ACTUATING CAM

RELAY  
CLEARING  
SWITCH

SOLENOID  
ACTUATING  
SWITCH

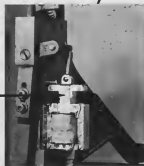
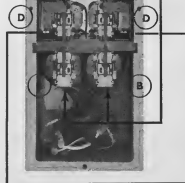
RELAYS FOR TAPE  
OPERATION ONLY

ENERGIZES  
'A' SOLENOIDS

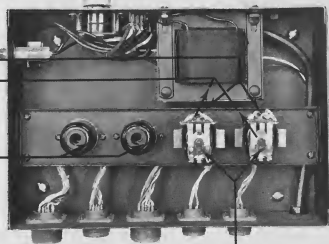
OPERATING  
PAWLS

ENERGIZES  
'B' SOLENOIDS

JUSTIFICATION  
STOP PAWL  
ASSEMBLY



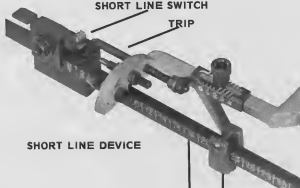
MEMORY CONTROL BOX



SHORT LINE SWITCH

TRIP

SHORT LINE DEVICE



MEMORY  
TRANSFER BOX



SELECTOR  
ASSEMBLY





# PRINCIPLES OF THE STAR SELECTRO-MATIC QUADDER

The Selectro-Matic Quadder consists of three principal divisions:

The Hydraulic Actuating Unit, which provides the power necessary for operating the quadder mechanism.

The Quadder Mechanism, which accepts signals from the memory system, and by means of hydraulic actuation, controls one or both vise jaws, for the required quadder functions.

The Electrical Memory System, which accepts the quadding signals as indicated by the operator, transfers these signals to the quadder mechanism at the proper time in relation to the machine cycle, as well as indicating to the quadder mechanism the signals for either quadded or justified material as pre-determined by the operator. The electrical system also operates the pot pump stop mechanism through a microswitch, solenoid, and control switch.

## THE HYDRAULIC ACTUATING UNIT

The basic function of the Hydraulic Actuating Unit is to raise the Actuating Slide attached to the vertical racks in the Quadder Mechanism to provide left, right or center quadding. This is achieved by depressing a piston in the master cylinder, by the specially designed, outboard hydraulic actuating cam. Hydraulic power is transmitted through a connecting hose to a piston in the slave cylinder, raising the piston and the vertical racks. This provides the necessary actuation for quadding. The cam, in addition to actuating the hydraulic system, allows the jaws to back off slightly between first and second justification to permit proper alignment of matrices to mold. A relief in the cam is also provided after casting, so the matrices are guided with a light wiping motion, but not held tightly, as they rise out of the vise jaws.

A reservoir and two valves are parts of the hydraulic system. A relief valve opens when proper vise jaw pressure has been attained, returning the excess fluid to the reservoir. After casting, fluid is returned from the reservoir, through a check valve, back into the master cylinder. This refills the cylinder for the next quadding cycle.

## THE QUADDER MECHANISM

As the hydraulic piston in the slave cylinder rises, it carries with it the actuating slide which extends through the back of the quadder housing. Inside the quadder housing, the slide block is attached to the actuating slide, which rises with each machine cycle. When quadding is

required, the selected operating pawls are engaged with the vertical racks. As the slide block rises it carries the vertical racks with it. The vertical racks are engaged with gears, which, in turn, move the horizontal racks. The vise jaws are attached to the horizontal racks and either or both jaws move inward to provide the proper quadding function. When the slide block and vertical racks descend, the jaws open outward and return to their original position, ready for the next line.

## ELECTRICAL SYSTEM THE MEMORY SYSTEM— HOW IT OPERATES

The Memory System requires no specialized electrical knowledge for operation or maintenance. The Memory System is shown on the opposite page, indicating the route of quadder signals.

When a selector button is depressed for right, left or center, a circuit is completed through the short line switch to the memory transfer box. When one of the selector buttons is depressed, the signal is held in the selector assembly until the assembling elevator rises. As the elevator rises, the actuating rod in the memory transfer box is pushed forward, transferring the quadding signal by energizing either or both right hand relays in the memory control box. These relays remain energized, holding the signal until a cam on the hydraulic and switch actuating cam closes the solenoid actuating switch through a lever extending up from the box housing the switches. This action transfers the signal from the relays to solenoids A-A, in the lower part of the quadder housing. Energizing solenoids A-A causes pawls to engage either or both vertical racks, which then provide for left, right or center quadding.

As the solenoids A-A are energized they also close either or both microswitches D-D in the quadder housing. This completes a circuit to the justification stop pawl solenoid, locking out the justification rod and prevents spaceband drive during quadder operation.

During the casting cycle, the relays in the memory control box are cleared by the relay clearing switch, for acceptance of the next quadding signal. Before the machine returns to normal position the solenoid actuating switch is closed for the second time, energizing solenoids B-B to disengage the pawls from the vertical racks. This returns the quadder mechanism

to normal, ready for the next signal. When equipped for operation from tape signals, the two additional relays shown in the Fold-Out opposite page 1 are used.

The short-line switch is a normally-closed switch, permitting the quadder signal to be sent from the selector assembly to the memory transfer box. When the trip depresses the short line switch, it breaks this circuit and prevents any quadding signal from being transferred to the relays. Let us assume the short-line device is set at three, and a full line of mats is sent

into the machine. The short-line switch will be opened, since no quadding is possible on lines which are within three picas of being full lines. If the quadder is in quad position and a line is sent in which lacks more than three picas of being full, the switch will remain closed and a quadder signal will be given to the memory box. If the short line switch is set at zero, all lines will quad, regardless of line length, provided the three-position switch is set at "Quad". The sequence, therefore, is that the line will quad until the signal is cancelled by the trip.

## ROUTINE MAINTENANCE

### LUBRICATION

Note:—Where oil is required for lubrication, use only oil shown by Star Part number listed.

1—FASTENING PLATE: (on left hand end of vise cap) A drop or two of oil weekly (Z-29) (See Figure 1)

#### 2—HYDRAULIC ACTUATING UNIT:

- (a) A few drops of oil in the oil cups weekly. (Z-53) (See Figure 9)
- (b) With gun, grease cam roll about once a month at Zerk fitting.
- (c) Check oil level weekly. Lower line is danger level. **Do not fill above the upper line.** Use only quadder hydraulic oil provided. (Q-733)

#### 3—QUADDER HOUSING:

A drop or two of oil weekly, in oil hole in top front cover. (Z-53)

#### 4—VISE CAP:

Clean and lubricate when necessary. (Z-29) Check occasionally by opening vise jaws to 30 ems and moving jaws from side to side. If the jaws return freely, you will know the vise cap ways are clean. If not, clean and lubricate as follows:

Open the vise and swab the ways with kerosene. Clean out thoroughly with a rag. Squirt a little quadder oil, Z-29, into the ways and spread it by moving jaws from side to side.

#### 5—MEASURE CONTROL:

A drop or two in oil holes weekly, (Z-29), and also a few drops on the side of the gear through the hole in the guard.

#### 6—MEMORY TRANSFER UNIT:

The memory transfer located under the keyboard should have a drop or two of oil (Z-29) every two or three months on each end of the switch actuating rod, and on the swivel-joints of the knuckle actuators. **DO NOT OVER-LUBRICATE.**

#### 7—PUMP STOP:

Periodically the pump stop should be checked to see that the pump stop lever is operating freely and is seating against the stop pin. Lubricate with a few drops of oil, (Z-29) and keep metal chips away from mechanism.

#### 8—SPACEBANDS:

It is essential that spacebands be kept clean and well polished for efficient line justification. We recommend spacebands be washed in hi-test gasoline or spirits, dried, inspected and polished with fresh graphite at least monthly. Spacebands should be polished twice each shift. While the pump stop is very sensitive, it has been designed to prevent casting of lines which are not fully justified. This is a safety feature of the Star Quadder as it permits only positively justified lines to cast, thereby helping eliminate hairlines caused by "marginal" justification.

# ADJUSTMENTS

## CENTER ADJUSTMENT

In order to check for the accuracy of the centering adjustment of your Star Quadder, cast two slugs using matrix characters like "H" or a down-rule. Hold these back-to-back lined up evenly. It will become immediately apparent whether the center adjustment is off, and if so, which way. Remember—only the left hand vise jaw is adjusted for centering purposes.

For adjustment, referring to Figure 1, proceed as follows:

- 1—Open the vise.
- 2—With measure control, set the vise jaws to 24 ems.
- 3—Loosen lock screw (1) with the small Allen wrench.
- 4—Push the left hand vise jaw to the right to expose the center adjusting screw (2). With the same wrench placed in one of the exposed holes, turn the adjusting screw (2) either way as needed to obtain proper center.
- 5—Tighten lock screw (1) when final adjustment has been obtained.

## INDENTION ADJUSTMENT

If you wish to change indentions, adjust as follows:

### THE LEFT HAND INDENTION (see Figure 1)

- 1—Remove the upper quadder housing cover.
- 2—Open vise.
- 3—In the recessed center of the fastening plate (6) there is an Allen head lock screw (3). Loosen this screw, and close the vise.
- 4—Go back to the front of the housing. Inside, above the vise jaw racks, is the indention adjusting screw (4). Turn it in or out depending on which way the margin is to go. This screw can usually be turned with fingers, but if it is tight, remove the rack guard on the left side of the housing and adjust with screwdriver in screw slot (5).
- 5—Be sure to tighten the lock screw (3) in the fastening plate (6).
- 6—Do not attempt to change left hand indention by changing the indicator dial.

### RIGHT HAND INDENTION (See Figure 2)

After indention adjustments are made in usual way, by means of the adjusting screw on the knife block, loosen lock nut (1). Bring the adjusting screw (2) on the support to contact

bearing against the R.H. vise jaw. Then cast a slug and if further adjustments are necessary, follow same procedure. When final adjustment is made there should be no rock, sidewise, in the R.H. vise jaw when casting justified, or right flush lines.

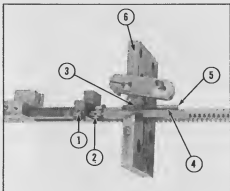


FIGURE 1

View of centering and left hand indention mechanism from inside the vise cap.

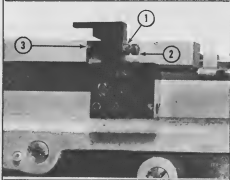


FIGURE 2

View from top of vise cap

### WISE CLOSING ADJUSTMENT

Loosen the lock nut (1) and turn adjusting screw (2) up or down to obtain approximately  $3/16"-1/4"$  movement during the casting cycle. (See Figures 3 and 4.)

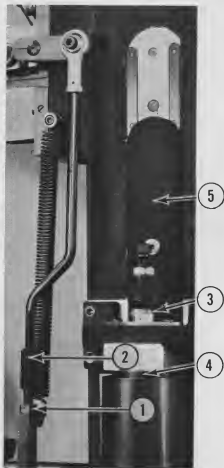


FIGURE 3

### ADJUSTMENT OF DELIVERY SLIDE OPERATING PAWL AND FINGER

The delivery slide ratchet operating pawl must be clear of the ratchet when it is in normal position.

The design of the pawl and steel finger (attached to the spaceband box) is such that the pawl is lifted above the ratchet when the slide is returned to normal position. This action is accomplished by the angle of the end of the steel finger, and by the inward pressure of the

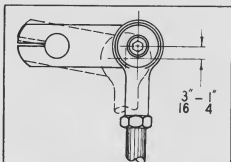


FIGURE 4

finger against the bevel of the cam on the long finger block. The pressure must be sufficient to raise the pawl above the ratchet. Lubricate with a very small amount of grease weekly.

When it is necessary to replace the pawl on the long finger block, remove the shoulder screw, being careful not to drop the bushing and spring.

The bronze delivery slide long finger spring should be bent so its top extends to the right of the long finger by approximately  $1/4"$ . The detents in the first elevator front and back jaws must have sufficient tension to retain the matrices when the line is in the first elevator jaws. The tension of the springs should be uniform.

### ADJUSTMENT OF THE SHORT LINE DEVICE (See Figure 5, page 6)

It is absolutely essential that the assembler slide indicating bar (7) be perfectly parallel with the assembler slide (13). This condition can be determined by sighting across bar (7) and checking its parallelism with the assembler slide (13). It may be necessary to readjust or bend the bracket supporting bar (7) in order to achieve this parallelism.

There is a small steel roller in brass bracket (1) which is attached to the assembler slide. This roller must make contact with the assembler slide indicating bar (7) on the entire 30-em travel of the assembler slide. This may be adjusted by changing the location of the bracket, by loosening the Allen screws on the right hand end of the bracket, or by slight bending. This adjustment should be made before any further attempt is made to adjust the short line device. Proper adjustment is essential, because the bracket supports the assembler slide, and must allow free movement when the assembler slide brake is released, as well as during the assembly of a line of matrices and spacebands.

Adjust the screw which banks against the tight line release (11), to set the assembler slide for its proper length of line. This adjustment is

correct when a line of matrices and one spaceband will justify the spaceband level with the top of the first elevator jaw, when the star wheel is just "sputtering". Next, adjust pointer (6) to "0" when the assembler slide is in its extreme left position.

Remove the nut and washer (8) which hold the microswitch assembly (19) to the left end of the assembler slide indicating bar (7). This will expose a plate (17) with an elongated hole. Loosen the two 4-48 screws (9) which hold the trip rod guide (10). Raise the guide to its highest position. Turn screws in to a snug bearing, not tight. Set the trip rod on "3". Next, move the assembler slide to its extreme left position, which will place rod (3) over the roller of the actuator (4).

Replace nut and washer (8) but do not tighten the nut. While holding the roller in bracket (1) against bar (7), raise the microswitch assembly (19) until the microswitch is depressed to its limit. At this point tighten nut (8). While holding the roller and bar in this same position, loosen the two 4-48 screws (9) which will permit trip rod guide (10) to drop down and contact rod (3). Tighten these two screws (9).

Check for free action of the assembler slide (13). The bracket (1) should now make its complete travel, including the tripping of the microswitch with little or no deviation of contact. A drop of keyboard oil on the bracket roller (1) and on the microswitch actuator roll is desirable.

In some instances, the indicator bar (7) is bent and should be straightened if necessary, as repeated punching of the tight line release lever (11) may cause bending of this rod. This would be apparent when checking for parallelism.

Adjust the trip rod (3) so it just contacts the microswitch actuator roller (4) with the pointer (6) on "0" and the short line device (22) is set at "0". This setting will then trip the microswitch at approximately the same measure as the setting of the trip (22) and pointer (6) regardless of line length being set.

#### CHECKING THE MICROSWITCH AND LEADS

With the quadder set to center a line, lightly press down on the switch actuator roll (4) with a finger until you hear the switch click. Hold the switch closed in this position as you raise the assembling elevator. If the vise jaws move to center, you will know that the switch is not working—either because it is defective or because its wire leads (20) are disconnected or broken. In this case, replace as follows:

Remove the nut and washer (8) which hold the microswitch housing (21) to the assembler slide indicator bar (7) as well as the Allen Head

screw (15) at the other end of the bar. The conduit (18) and microswitch assembly (19) will come off together. When replacing the switch, be careful that there is no excess solder which may cause a short circuit.

#### IMPORTANT — PLEASE NOTE

Should the quadder functions be erratic when using the short line switch, it is well to re-check the adjustments to be sure the switch is depressed when within the 0-4 range as predetermined by the operator.

Because the short line switch, when depressed, breaks the circuit from the memory transfer box to the relays, it is essential that the assembler slide (13) remain in its left position until the assembling elevator back rail is within 1/16" of its upper banking position.

#### ASSEMBLER SLIDE BRAKE FOR LINOTYPE

Because the parts which constitute the assembler slide brake mechanism are hardened, the only normal maintenance required is to keep the unit clean. Sometimes graphite or oil will accumulate on the top surface of the assembler slide preventing the locking action from being secure. These parts can be washed in a solvent, and if the top surface of the slide is glazed, it may be necessary to use crocus cloth or very fine emery cloth to remove this glaze.

Should adjustment of the unit be required, the parts should be removed and thoroughly cleaned. CAUTION — When removing the unit, be very careful not to lose the roller, spring, and tube, as these are spring-loaded and will be lost unless they are removed carefully.

When the parts are reassembled the adjusting screw and lock nut on the top of the unit should be adjusted so the roller will be approximately 6 pts. (.083") away from the step through which the tube passes on the left hand side of the brake roller adjusting support. Loosening the screw and raising the support will place the roller closer to this step. In order to tighten the screw it is necessary to move the assembler slide to the left while turning the screw downward. When this distance is correct, lock the adjusting screw nut.

Test the brake release by pressing the brake trip, noting that the assembler slide returns to the right with no bind or hesitation. The drag on the assembler slide should be uniform when the assembler slide is moved to the left.

Before adjusting the operating lever adjusting screw and nut on the bottom of the assembler slide brake, check the assembler slide brake operating lever D-1463 or D-5727, being sure the spring on the right hand end of this lever has sufficient tension. When the assembling elevator



is raised, the right hand end of the operating lever is pushed downward and the spring tension should be sufficient to hold this lever in its downward position until the lever is again raised by returning the assembling elevator to normal position.

To adjust the long screw and lock nut on the bottom of the assembler slide brake, raise the assembling elevator until the back rail of the assembling elevator is within 1/16" of its upper banking position. This distance is between 4 and 6 points. With the assembling elevator in this position, adjust the lower screw until the assembler slide is released and will move freely from left to right. Tighten the lock nut.

Double check these adjustments by removing the spacing above the assembling elevator and placing the elevator in its highest position, and holding it in that position. There should be a very slight movement of the brake roller when the trip is pressed by hand. This will be an indication that the assembling elevator is not restricted in its upward motion because of any action of the assembler slide brake.

In some instances, because of wear, it is necessary to replace the assembler slide brake lever with the improved style D-5727-A, which has an extension on its left hand end in order to secure more action.

It is essential that the entire assembler slide brake be dowelled, or a stable adjustment cannot be made.

#### THE ELECTRO PUMP STOP SAFETY ADJUSTMENT OF THE L.H. VISE JAW SAFETY SWITCH (See Figure 6)

Set the measure for 12 ems and push the left hand vise jaw to the right hand vise jaw. Holding it tight against the R.H. jaw, loosen the lock-nut (3) and turn adjusting screw (2) in until the pump stop clicks and the red light on the selector assembly goes on.

Be sure not to turn the adjusting screw too

far as it will cause the pump stop to stay open. If the red light stays on after pressure is released on the L.H. vise jaw, it will indicate adjustment has gone too far.

The setting of the adjusting screw is correct when one thickness of newsprint placed between the jaws will permit the pump stop to operate, and two thicknesses will not. The paper should be placed just below the switch operating rod — and the jaws pushed together by hand.

#### REPLACEMENT OF L.H. VISE JAW SAFETY SWITCH (See Figure 6)

Remove the L.H. vise jaw from the guide block. Remove the four screws (1), and switch holding screw (9). Remove leads from the switch (5) and resolder them on the new switch.

Take out screw (10) and remove the spring plate assembly (6). See that spring is intact and that the spacing at the top is about 1/8" from the plate. Reassemble as shown in drawing, and readjust the switch as described above.

#### REPLACEMENT AND ADJUSTMENT OF POT PUMP SOLENOID

Remove screw (1) from right hand end of operating lever. (Figure 7) Loosen two Allen screws (2) on the bracket and unit can be lifted from machine for cleaning or servicing.

To adjust—press the switch operating rod (13, Figure 6) in the left hand vise jaw, which closes the solenoid. Then adjust by sliding the entire solenoid and bracket unit back and forth until the stop lever (3, Figure 7) clears the stop block on the pot pump lever. Tighten the two Allen screws and recheck clearance. While this adjustment is not critical, care should be exercised to prevent excessive motion of the stop lever, so it does not strike the stop pin (7) on the pump stop bracket. The solenoid must close completely, or a hum and damage will occur.

See Figure 8 showing old style Pot Pump Solenoid Bracket. The action of the pump lever is adjusted by changing the position of adjusting nut (7) and the retaining screw.

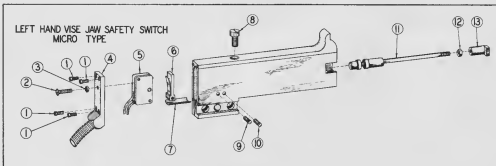


FIGURE 6

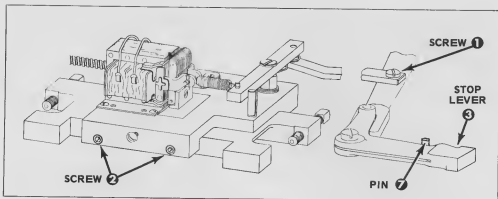


FIGURE 7

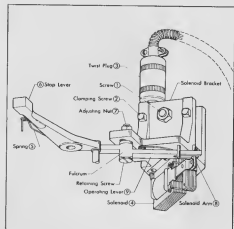


FIGURE 8

### THE HYDRAULIC ACTUATING UNIT (See Figure 9, Page 9) CARE

This is a very simple mechanism but one of great precision and will require very little attention. Certain precautions should be taken, however, as outlined below:

- 1—Do not turn the bleeder screws or permit anyone to tamper with them. If this should occur, oil will be drained from the system, and probably air will get into it. Loss of pressure will result.
- 2—Follow the lubrication instructions.
- 3—Keep oil at specified level with special hydraulic oil provided. A further supply may be ordered from the factory, branch or agency. (Part No. Q-733)
- 4—Keep dirt out of oil.

### OIL LEVEL

The oil level in the reservoir should be checked weekly merely as a matter of precaution. The oil should not go below the lower line nor higher than upper line. Use only the special oil provided with the hydraulic unit. A further supply may be ordered from the nearest branch or agency as noted previously.

To add oil, unscrew the cap on top of the reservoir. Pour oil slowly into the reservoir, using a small funnel. If filled above top red line, and the machine is placed into operation, pressure will break the reservoir if the cap is tightened. Use a syringe to remove excess oil.

### BLEEDING THE HYDRAULIC SYSTEM

(NOTE: If there is some upward motion of the slave piston, start with Step 7. If there is no motion of the slave piston, start at Step 1.)

- 1—Remove the oil reservoir cap.
- 2—Remove the master and slave cylinder bleeding screws. A small neoprene washer will be found at each bleeding port, and this should be removed with the screw.
- 3—Oil will gradually begin to flow from either the master or the slave cylinder bleeder ports.
- 4—As soon as the oil flow begins, replace the bleeder screw and washer at the point of flow. Wait until oil begins to flow from the other cylinder and then replace the screw and washer at that point. It is important that both of these screws be finger tight only. Excessive pressure in replacing the screws will result in damage to the neoprene washers.
- 5—Check to be sure that the oil level is between the two red lines on the reservoir, and add oil if necessary. Be sure the oil level does not go above the upper red line.



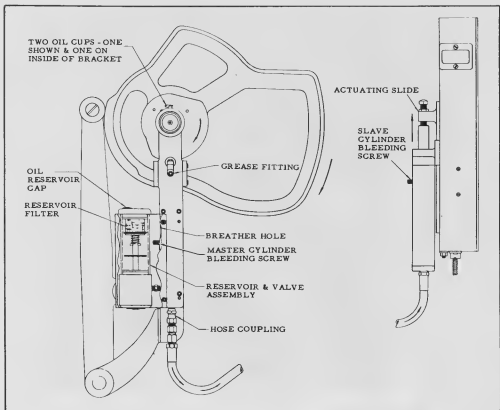


FIGURE 9

- 6—At this point there should be some upward motion of the piston in the slave cylinder, as the machine revolves. If there is some motion, but not sufficient to bring the jaws all the way across, proceed with steps 7, 8, 9 and 10.
- 7—Start machine and make four or five complete cycles with quadder set for 24 ems and flush left position.
- 8—Stop the machine in casting position (highest point of hydraulic cam). Back off bleeder screw on slave cylinder two full turns. (Be sure to cover screw with a rag to prevent oil from squirting over the machine or the person doing the bleeding operation.) As the oil flows, the slave piston will drop. Tighten the bleeder screw, finger tight only, just before the piston reaches its lowest point.
- 9—Make several more complete machine cy-

cles and stop the machine in casting position. Back off the bleeder screw on the master cylinder two full turns, taking the same precautions against oil squirting. As the oil flows out the slave piston will again begin to drop, and the bleeder screw should be tightened just before the piston reaches its lowest point.

- 10—Repeat steps 7, 8 and 9 until the full upward stroke of the slave piston is obtained. When all the air is out of the system, set the quadder for left flush on 30 picas. The jaws should come together, relieve, and drift apart. If not, repeat steps 7, 8 and 9.
- 11—In some instances, during bleeding, the hydraulic oil will become aerated and will appear foamy. This will disappear within a short time, and the unit should again be bled if a full 30-em line does not have sufficient quadding motion of the vise jaws.

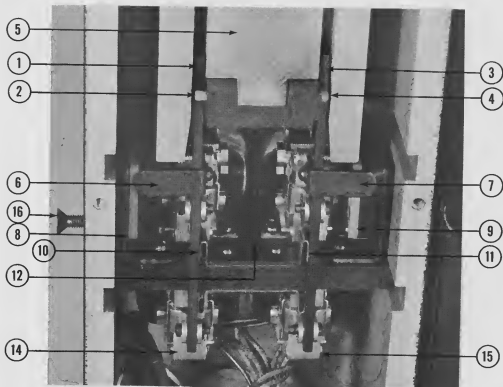


FIGURE 10

#### ADJUSTMENT OF SELECTOR OPERATING LEVERS (See Figure 10)

In older style quadders, the operating levers (1 and 3) may disengage from the pawl pins (2 and 4). In that case, lift the sliding block (5) and push either or both levers (1 and 3) into position so the fork of each is engaged in the pins (2 and 4) as you let them down. Levers (1 and 3) on later style quadders are designed so they cannot disengage from pins (2 and 4). (For further instructions on the solenoid and switch frame, see pages 18 and 19.)

#### WISE LOCKING STUDS AND SCREWS

The correct adjustment of the vise locking studs is achieved by turning the sleeve to permit a full bearing of the tip of the screw and the vise locking stud. Excessive pot lever spring pressure or excessive clutch tension are the principal reasons for vise locking screw tip breakage. (See Figure 11)

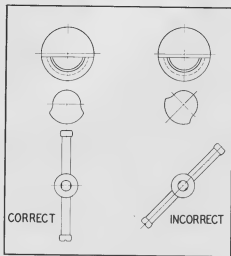


FIGURE 11

## MOHR SAW—MEASURE SYNCHRONIZATION

Do not attempt to change saw and quadder measures by slipping the measure control dial on its shaft.

Because changing the measure control dial normally changes both the line length and saw measure, slipping the dial setting on the shaft does not synchronize the quadder and saw. Provision has been made to separate these settings by means of a split shaft and collar between the bevel gear on the dial shaft and bevel gear on the measure control shaft. The collar is located near the end of the chip guard. The collar contains an Allen set screw, which fits into one of two indentions on the split shaft.

Before changing saw blades, note the position of the Allen set screw, marking this position so the collar can be easily returned to the original setting.

Change the saw blade in the usual manner. Disregarding the figures on the dial, turn the measure control dial until the saw cuts exactly 15 ems, using a Mohr saw gauge for this precise slug length. Note: Always complete dial settings by turning dial to the RIGHT, to eliminate back-lash in the saw and gears.

When the 15-em slug length is achieved, lock the saw. If the dial does not indicate "O", loosen the lock nut on the dial, turn the dial in a clockwise motion until it indicates "O" and tighten the dial lock nut. Re-check by turning the saw to about 12 ems and returning it to 15 ems, again sawing and re-checking slug length.

At this point the dial and saw will be syn-

chronized at 15 ems. However, the type may either have a shoulder or be "bled". To adjust the measure of the type to the end of the slug, loosen the Allen set screw, turn the collar slightly until it is in its original position and tighten the Allen set screw. Turning the collar in either direction changes line length, but does not change slug length, as the saw measure remains constant. The collar, with the loosened set screw, turns a portion of the split shaft, which changes the measure of the quadder, while center remains proportionate.

If the Allen set screw is not exposed on the "O" setting, loosen the screw sufficient to turn the collar on the split shaft  $\frac{1}{2}$  turn which places the screw in the opposite indentation in the shaft.

In some instances, changes have been made in the left hand jaw and center settings until the quadder will not open to 30 ems or center correctly. This is caused by cumulative errors in slipping the dial and re-adjusting center and margins in the quadder housing to compensate for these errors. In this case, it may be necessary to re-set basic factory settings, which will not be discussed in this manual. Write the factory, giving complete information regarding make of machine, Quadder serial number, Saw model and exact nature of the problem, and information will follow.

To summarize: Mark the collar, adjust saw to cut exactly 15 ems, change dial to "O," loosen collar and turn shaft to set margin, tighten collar securely.

# ELECTRICAL COMPONENTS

REFER TO FOLD-OUT OPPOSITE PAGE 1

## MASTER CONTROL BOX

The Selectro-Matic Quadder operates on 24 volts AC. This voltage is reduced from 110 volts AC by a transformer located in the memory box. The 24-volt circuit is protected by a 3.2 amp. screw-in type fuse, Q-463. The fuse is located on the top of the memory box.

A red indicator light on the side of the memory box lights when a 110 volt AC power switch on the memory box is turned on. The switch should be turned off at the end of the shift. The switch must be turned on for all casting operations, to supply power for the actuation of the pot pump stop, even though no quadding is required.

Inside the memory box are provisions for four plug-in relays. On quadders equipped for

tape operation, the two left relays are of the three-contact type, while on standard units, plugs are used to complete the circuitry. On all models, the two right relays are of the two-contact type. The right hand relays are interchangeable, as are the two left hand relays.

## THE SELECTOR ASSEMBLY

The Selector Assembly is attached to the side of the keyboard (or in the case of tape-operated machines, to a bracket within easy reach of the operator). This unit consists of a 3-button switch marked RIGHT, CENTER, LEFT, and a toggle switch on the top of the unit marked ON and OFF, which is in series with the circuit from the pump stop solenoid to the vise jaw switch. A 3-position switch is located on the right side of the unit marked

QUAD, JUST, RECAST. Red and green lights are located on the top of the unit, marked QUAD and CAST.

#### THE MEMORY TRANSFER BOX

The Memory Transfer Box is located under the right side of the keyboard and contains two microswitches, each with a knuckle actuator, and an actuating rod for operating the switches. The unit is operated by a small arm attached to the assembling elevator lever shaft. The arm must be adjusted so the rod, inside the memory transfer, makes a complete inward motion each time the assembling elevator is raised. This arm is adjusted by an Allen screw on the arm, which clamps the arm into position. When the rod is pushed in, each actuator must push its microswitch to bottom position. When the rod is returned to normal position, by a spring, the actuators must bend at the knuckles provided. There should be no action of the switches on the return cycle of the rod. The rod and knuckles should be lubricated with keyboard oil. (See Lubrication)

On tape-operated machines, the Memory Transfer Box is located on the left side of the keyboard, and there are three microswitches inside the Memory Transfer Box. Two of the switches, which are located opposite each other, are the same as above. The third microswitch operates only on the return cycle of the rod. The actuating arm is located on the left end of the assembling elevator lever shaft. It is essential that the rod in the transfer box make a complete stroke each time the elevator is raised.

The microswitches in the Memory Transfer Box are adjustable by loosening the two screws holding each switch, and moving the switch so the switch is depressed to its bottom position by the actuator, when on the high point of the rod. (See Figure 12, Page 17)

On earlier models, the microswitches had no provision for a bottoming position and should be adjusted so there is approximately .005" to .010" of action of the switch after the click is heard.

#### THE SHORT-LINE DEVICE

The Short-Line Device is a part of the assembler slide mechanism and consists of a microswitch, which is depressed by a trip. Because the trip is adjustable in increments of

6 pts., a variation in tripping position of the switch is accomplished. The trip must be adjusted so it will not actuate the microswitch when it is set at "0", and a full line of mats is assembled.

#### THE SOLENOID ACTUATING SWITCH AND RELAY CLEARING SWITCH

These switches are located behind the hydraulic and actuating cam, and operate through two levers from a cam and pin on the hydraulic cam. These switches are adjusted by loosening two small nuts on the side of the switch housing, relocating the switches, and again tightening the nuts. The lever on the outside of the cam operates the microswitch which controls the solenoids inside the quadder housing, while the inside lever operates a microswitch which clears the relays in the memory box.

#### THE SWITCH AND SOLENOID FRAME

This unit consists of the four solenoids and two microswitches located inside the lower quadder housing. The two upper solenoids engage the pawls, in the sliding block, with the vertical racks. The lower solenoids disengage the pawls. When either pawl is engaged, a microswitch is closed by a small operating lever extension. The closing of either or both microswitches energizes the justification stop assembly.

#### JUSTIFICATION STOP PAWL ASSEMBLY

This unit is attached to the left side of the vise frame, and consists of a solenoid which operates an adjustable lever to prevent the raising of the justification levers when a quadded line is desired. The adjustment of the unit allows the lever to clear the collar on the justification rod when the machine is in normal position. On quadded lines the lever remains in position over the collar, and is adjusted to allow only about  $\frac{1}{8}$ " upward movement of the spacebands.

On earlier models the assembly is located inside the vise frame and serves the same function.

#### THE ELECTRO-PUMP STOP

The Electro-Pump Stop consists of the left hand vise jaw, containing a microswitch and its adjusting mechanism, and a solenoid with its mechanism for the operation of the pot pump stop lever. (See Figures 6, 7, and 8)

# HOW TO CHECK THE ELECTRICAL CIRCUITRY

The electrical system of the Electro-Matic Quadder was designed to be serviced by personnel who do not have a specialized knowledge of electricity. For this the simplest electrical components are used, namely: microswitches, solenoids, and relays. Because these units operate on 24 volts AC there is no danger of electrical shock except on the small terminal in the memory control box, to which the transformer is connected. There is no danger from any of the wires on the plugs, the relays, or any exposed wires. Should there be a short-circuit, there will be a very small arc, with the possibility of blowing out the fuse on the top of the memory control box.

In the following, we shall explain the operation of the electrical equipment and its circuitry, and check trouble by isolation and/or replacement of units, in order to determine which unit is causing the trouble. In order to locate the source of trouble in the electrical system, it is essential to understand the sequence of operation of the various electrical units. A step-by-step procedure is given below, as well as a discussion of the parts to check, should there be a malfunction at any point during the testing cycle. This checking can be done without placing the machine in operation.

Remove the cover from the memory control box, the lower quadder housing cover and remove the memory transfer box under the keyboard by removing the two large screws located on the front of the box and one screw on the back of the box. The machine should be in normal position, the main switch on the memory control box should be turned on, lighting the red light, the pump stop switch on the selector assembly should be turned on, and the three-position switch on the side of the selector assembly should be in the "QUAD" position.

We shall now simulate the quadder functions of the electrical system, by placing the machine in center quadding position. Press the selector button for center. Push the actuating rod on the memory transfer box to its limit, and let it return. As the actuating rod is depressed, the microswitches will operate, transferring the signal so that the two relays (for push button control) in the memory box will be heard to snap. This snap will indicate the relays are closed.

If only one relay closed, it will indicate one of the microswitches in the memory transfer box is not operating, or one of the relays is not

operating. To check this, transpose the two relays in the memory control box.

At this point it is well to mention that the relays can be released by turning off the master switch on the memory control box momentarily, and then turning it back on.

Repeat the operation of pressing the actuating rod, and again check the relays for operation. If the transposed relay failed to close, it will indicate that the relay should be replaced, or has dirty or misaligned contact points. If the opposite relay failed to close, it will indicate that one of the switches in the memory transfer box did not close sufficiently to make contact, or the switch is defective. All relay contacts should be clean and have a slight wiping action when full contact is made in either open or closed position.

To check the action of the switches, use a small screwdriver to press the right hand microswitch actuator. This should transfer a signal to one of the relays. Pressing the opposite microswitch should transfer the signal to the other relay. If the relays are actuated by pressing the microswitches by hand, it is an indication that the microswitches should be adjusted for proper action or the actuator is bent. The right switch actuates the right hand relay when viewed from the back of the machine, while the left switch operates the left hand relay.

In order to check microswitches for contact, use a short strand of insulated wire as a "jumper" across the contacts to which the microswitch wires are fastened. This will provide a check to see that the electrical circuitry is complete, without going through the switch. If the relays are operated when the jumper is used, but do not operate when the switch is depressed, the microswitch should be replaced.

Let us assume that both the relays are now in the closed position—we will continue with the testing of the quadder circuit. Refer to "The Electro-Matic Memory System" (Fold-Out). With both relays closed, push the solenoid actuating switch lever on the back of the hydraulic unit to its limit, and release it. This is the lever on the outside of the hydraulic and actuating cam. When this lever is moved, a switch energizes the solenoids in the bottom of the quadder housing, engaging the operating pawls with the vertical racks. If both relays are closed and only one of the pawls is actuated, it is possible that a relay is not operating correctly or one of the solenoids is at fault. This can be checked by

transposing the relays as mentioned previously or by replacing the solenoid.

The next step is the releasing of the relays to their normal position. This is done by pushing the relay clearing switch solenoid lever on the inside of the hydraulic and actuating cam. When the relay clearing switch makes its contact, it will release both the relays in the memory control box to their normal position. If the relays do not open it is an indication that the switch is defective or is out of adjustment, or the relays are sticking and should be replaced.

The solenoid actuating switch and relay clearing switch are adjustable by means of two small hexagon head screws, which loosen the microswitches so they can be adjusted back and forth. These switches must be adjusted so they make and break contact by very slight action of the operating lever. The motion of this lever is very small, and care must be used in adjusting the switch for a positive click of the switch as the lever is moved in either direction. Be sure the cover does not bind on the operating levers. Because this is a rather close adjustment, care should be taken to see that it is operating correctly. If the functions of the quadder are correct when operating these levers by hand, and does not operate when the machine is under power, these switches need further adjustment.

When the operating pawls are engaged, during the quadding cycle, the justification stop pawl assembly will be in operation. There are two microswitches inside the quadder housing operated by extensions on the operating pawl levers. These switches are in parallel with the solenoid in the justification stop pawl assembly. Should the justification stop pawl assembly fail to operate, either the switches are not making contact, or the solenoid is inoperative. This can be checked by pressing the microswitches by hand, or using a jumper wire to by-pass the switch and by replacement of the justification stop pawl solenoid. It is possible the extensions may be bent outward, which prevents sufficient motion of the microswitch. If the justification stop operates on center but fails to operate on either right or left flush, it is an indication that one of the microswitches is not closing completely, or requires replacement.

The last portion of checking the electrical equipment is to again operate the outside solenoid actuating switch lever on the back of the machine, which will energize the two lower solenoids in the quadder housing and return the operating pawls to their normal position.

To sum up the manual testing of the quadder, press the memory transfer box actuating rod which closes both relays. Press the outside

lever on the solenoid actuating switch which closes the upper solenoids for engagement of the operating pawls. Release the relays by pressing the inside relay clearing switch. Again press the solenoid actuating switch which will return the operating pawls to their normal outward position. During this cycle, the justification stop pawl will operate so long as the operating pawls are engaged.

The above testing has all been done with the selector assembly in the center position. Repeat the same operation by depressing the selector button for flush left, and then flush right. If only flush left signals are received when the machine is on center, or only flush right signals are received when the machine is on center, it is an indication that the three button selector switch for right, center and left is defective. This can be checked by removing the switch and replacing it.

After replacing the memory transfer box, under the keyboard, it is essential to check the operation of the actuating rod. When raising the elevator to its upper limits, the actuating rod must be pushed in to its limit. Adjustment can be made by relocating the arm on the assembling elevator lever shaft.

Note: The 3-position switch on the side of the selector assembly must be in QUAD position for all quadder testing. When this switch is in "JUST" position, the quadder will not accept any quadding signals. When in "RECAST" position, the relay clearing switch circuit is broken, and the relays will not open — holding whatever quadder signal had been sent to the relays. When the above 3-way switch is in either "QUAD" or "RECAST" position, the green light will burn, provided the short-line switch is not depressed. This light will not burn when the quadder is in "JUST" position or the short-line switch is depressed.

Signal light bulbs are changed by unscrewing the red or green domes and sliding the bulb out of the dome.

#### MASTER CONTROL BOX PILOT LIGHT

This light goes on with the Main Switch next to it. If the light goes out with the switch in "ON" position, it will mean either that the bulb is burned out, or that the power line is no longer feeding current to the quadder.

When all signal lights except the one on the Master Control Box fail it will indicate that the Transformer needs replacing.

#### SELECTOR BOX GREEN LIGHT

All Slectro-Matic Quadders beginning with Serial No. F4-1744 will have the Quadding Indicator Light which is mounted on the Selector Box, wired in series with the Assembler Slide

Switch. This will have the effect of having the green light go out when the line being set is long enough to justify. When the light stays on, the line being set will either quad right, left, or center as selected by the operator.

## TROUBLE SHOOTING

### EMERGENCY OPERATION

If the Left Hand Vise Jaw Safety does not operate, do not attempt quadding operation until repair has been made.

Should the Memory Circuit be put out of operation because of a damaged electrical unit the Quadder may be operated manually. First remove the relays (See Fold-Out), then remove the lower front cover on the Quadder Housing, and manually push operating levers (1) and (3) (Figure 10) in and out for the quadding function desired. Push in the left hand lever (1) for right flush; right hand lever (3) for left flush; and both levers for center.

For justified composition, remember to depress the lower part of operating levers (1) and (3), so the engaging pawls, (2) and (4) are in "out" position, as illustrated in Figure 10.

This method of operation is not as efficient as when the push buttons are used, but it will keep the Quadder in operation during an emergency.

Although the electrical components of the Star Quadder have been thoroughly checked out for long life and durability, it is recommended that a small electrical parts kit be kept on hand. These parts, which are listed below, will help you keep your Quadder operating at its best.

Solenoid	Q-358
Relay	Q-474
Relay (For tape only)	Q-735
Relay Clearing Switch	Q-55
Solenoid Actuating Switch	Q-55
Light Switch	Q-364
Justification Solenoid	Q-734
Pot and Pump Solenoid	Q-1570
L.H. Vise Jaw Safety Switch	Q-59
Dome Light Bulb	Q-441
Fuse	Q-463
Push Button Switch	Q-434

If this system is desired for quadders with lower serial numbers wiring instructions are available on request. Give serial number when wiring.

### WISE LOCKING STUDS AND SCREWS — BREAKAGE

When breakage occurs frequently it is because of improper bearing of the two "lip" surfaces of the stud and screw respectively. The bearing should be full at all times.

Figure 11, page 10, shows the proper and improper relationships of the two parts. Adjust the vise locking screw, if necessary.

Another cause of repeated breakage may be found in a vise that is "out of square" with the frame. A Star vise aligning tool (Z-84) is available, which makes checking this portion of the machine an accurate procedure. Instructions are provided with the tool.

### WHEN VISE JAWS FAIL TO CLOSE COMPLETELY

This can be checked by watching the rise of the piston (3) (Figure 3), in the slave cylinder (4). If it does not push the actuating slide (5) all the way up, and is slow in returning to position, you will know that the following three possible causes are to be sought out:

- 1—Lack of lubrication in the seal of the master cylinder.
- 2—Oil leak due to worn seals in either slave or master cylinders.
- 3—Air in the hydraulic system.

The remedies are as follows:

For Cause No. 1:

Squirt a few drops of the hydraulic oil in the breather hole shown in Figure 9. This will put lubrication between the piston and seal which may have become dried out.

For cause No. 2:

If the leak is coming from the bleeding screw on either cylinder, it will be due either to a looseness of the screw or a distortion of the little seal between the screw and the cylinder. The screw should be finger tight, but if forced beyond that point, the seal may become distorted and make an imperfect closure. The seal should be replaced.

If there is a leak from any other part of the system it will be necessary to send for a replacement hydraulic actuating unit complete. Within the guarantee period replacement will be made gratis except for the transportation both ways.

For Cause No. 3:

Air in the hydraulic system calls for the procedure outlined on page 8 and 9.

#### IF ALL LINES FAIL TO CAST

Press the switch operating rod (13) (Figure 6) on the L. H. vise jaw. If a click results and the red light on the selector assembly comes on, it will indicate the safety switch needs adjustment. The adjustment instructions will be found on page 7 under the heading "THE ELECTRO PUMP STOP SAFETY".

If the red light comes on and there is no click from the pump stop solenoid it will indicate the solenoid is burnt out, or there may be loose connections.

If a buzz is heard when the vise jaw button is pushed in, it will indicate that any of the following may be wrong:

- 1—The solenoid arm may be improperly seated because of dirt. Check solenoid in back of machine column.
- 2—The pump stop solenoid bracket may be loose and requires re-adjustment to actuate the stop sufficiently to clear the pump lever block.
- 3—The pot pump lever cam roll (BB-31) may have a flat spot on it causing the stop lever to bind because the lever is too low.

#### IF OCCASIONAL LINES FAIL TO CAST

Check the following:

- 1—Power Source. Examine plug and connections.
- 2—Pump Stop Switch on top of Selector Box. Should be in "on" position.
- 3—Micro-Switch in Left Hand Vise Jaw. (See Page 7)
- 4—Pot pump Solenoid. (See Page 7)
- 5—Examine Spacebands and make sure they are clean and sliding freely.

#### IF LINE FAILS TO QUAD

If only Left Flush or Right Flush lines fail follow Steps 2, 3, 4, 6 and 7 as listed below. If the Center operation is included in the failure, begin with Step 1 and follow through until the cause of failure is found.

Step 1—POWER: (See Fold-Out opposite Page

- 1). The green light on the Selector Box indicates that current is coming to the box and the Pump Stop Circuit. If it is out, check the

Pump Stop Switch next to it, and see that it is in "ON" position. Next check the Control Switch on the side of the Selector Box, to make sure it is in quadding position. All being in order up to this point, go back to The Master Control Box and check in order: The Power Switch and the Signal Light which tells if the power supply is coming to the quadder; the power supply connections (plug and receptacle) to see if they are not loose or defective; and finally the Fuse to see if it is burnt out. If nothing wrong is found in this area, proceed to the next step.

Step 2—SHORT LINE SWITCH: (See Figure 5, Page 6). Make sure the Short Line Adjustment (2) is at the correct position on the Scale (22), so that the Trip Rod (3) is not cancelling the quadder signals.

Step 3—THE MEMORY TRANSFER UNIT: (See Fig. 12). The trouble may lie in the maladjustment of the Switches in the Memory Transfer Housing either due to the accidental hitting of the Housing or through some other cause, such as lack of lubrication (see page 2). Remove the Memory Transfer Housing from the keyboard by unscrewing (3), (4) and (5) screws. Then check the adjustment of the Switches as follows:

- (a)—The Switches should be closed when the rollers are on the high point of the Actuating Rod. Slowly depress the Actuating Rod Button and listen for the click of the switch as the roller reaches the high point of the rod. If you do not hear the click of the switch proceed to the next step.
- (b)—Each switch\* is fastened by two Screws, one screw through a round hole and one screw through a slotted hole. Loosen both screws approximately 1 to 1-1/2 turns. Snugly retighten the screw which goes through the round hole. Depress the button of the Actuating Rod until the Roller of the Switch is on the high point of the rod. Then move the switch in towards rod. When it clicks, tighten the screws. Check the adjustment as in step (a).

\*NOTE: There are two types of switches in use in these Memory Transfer Units. They can be identified by an examination of the Detail A and Detail B in the drawing. One type as shown in Detail A has a controlled over-travel feature. This type of switch is supplied whenever a switch replacement is re-



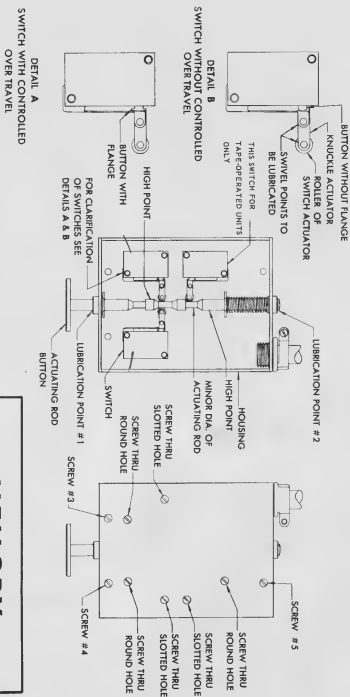


FIGURE 12

THE ABOVE VIEW SHOWS THE SWITCHES  
 AS THEY SHOULD APPEAR IN NORMAL  
 POSITION

# MEMORY TRANSFER UNIT

quired. The two switches are interchangeable.

The second type shown in Detail B has no control for over-travel, so that additional care must be taken in making adjustment. At the time the click of the switch takes place, the button of the switch should be depressed by no more than approximately .005". This measurement is given only as a guide in adjusting so that the switch will not break down from mechanical failure. The test for this is to have some movement left in the switch after the click is heard.

- (c)—When depressing the Actuating Rod, watch to see if it returns to its outer position freely. If it does not return freely, it will indicate the switches are probably set too close. This is assuming that the Actuating Rod has been lubricated as set forth on page 2 of this manual.

All Switch Knuckle Actuators should also return freely to their normal positions.

- (d)—The lever which depresses the actuating rod should be set so the rod is in its full inward position when the assembling elevator is locked at line delivery. Allow about 1/16" play between lever and button, when in this position.

- (e)—When all the adjustments have been checked and made, if necessary, replace the Housing Unit with great care. Watch for pinched wires, or wires which are rubbing against the Actuating Rod. This is of vital importance.

**Step 4—RELAYS:** (See Fold-out). Remove Master Control Box Cover. See if screws in Relays are tight. Push the Center button in on Selector Box. Transfer the signal by hand and see if Relays are operating in the Master Control Box. If either one or both do not operate, test further by pushing the contact leaves in by hand. If then they fail to operate, the Relay Clearing Switch may be at fault; proceed to the next step.

**Step 5—RELAY CLEARING SWITCH:** (See Fold-out). Remove the Cover of the Relay Clearing Box in the rear of the Hydraulic Actuating Unit. Be sure the Operating Lever is not binding in the cover slot. Push the Operating Lever in to actuate the Switch. If the Switch fails to click replace it. If Switch is operating and the Lever is free in slot, then revert back to the Relays in Master Control Box. Try a new relay. If the trouble is not cleared up at this point, go on to the next step.

**Step 6—SELECTOR SWITCH:** (See Fold-out).

Remove the plate and withdraw the Switch from the Selector Box. The leads are easily pulled apart.

Put the three leads together and push in the Memory Transfer Button. If a Center operation results, it will indicate the Selector Switch needs replacing.

If, after all of the above procedure, the line still fails to quad, proceed to check:

**Step 7—SELECTOR OPERATING LEVERS:**

(See Figure 10). Remove the lower cover in the Quadder Housing. Either one or both of the Operating Levers (1) and (3) may be found behind the pins of the Engaging Pawls (2) and (4). If only Right Flush or Left Flush lines are obtained, one of the Levers will be out of position; if Centers only can be obtained, both Levers will be found disengaged. **ADJUSTMENT**

Lift the Sliding Block (5), and the Actuating Slide in back simultaneously. Push either or both Levers (1) - (3) into position so the fork of each is engaged in the pins of the Sliding Block as you let it down.

#### **IF SPACEBANDS JUSTIFY DURING QUADDING OPERATION**

These are the possible causes, to be checked by removing the lower cover of the Quadder Housing (See Figure 10).

##### **1—LOSS OF CONTACT WITH MICRO-SWITCH**

The Operating Lever Extension, (6) or (7), may be bent outward, or the Operating Lever (1) or (3) may be moving out as the Sliding Block (5) begins to rise. In either case contact will be lost with the Button of the Micro-Switch, (8) or (9), causing interruption of current to the Justification Stop Solenoid which actuates the Justification Stop Lever to stop Spaceband drive.

If the Operating Lever Extension is found bent, it must obviously be straightened carefully to restore contact. But if the Operating Lever is coming out as the Sliding Block rises, it will mean that the Retaining Spring (10) or (11) has lost tension against the Lever. Remove the Plate (12) which holds the Spring. Stretch out the spring until satisfactory tension is obtained.

##### **2—A MICRO-SWITCH OR SOLENOID MAY HAVE FAILED** (See Figure 10, Page 10)

If Spacebands are driving up on a "Right Flush" signal it will generally indicate that the Solenoid (14), or Micro-Switch (8) on the left side of the Solenoid and Switch Frame has failed.

Spacebands driving up on "Left Flush" signals will mean that the Micro-Switch (9), or Solenoid (15), on the right side has failed.

### 3—JUSTIFICATION STOP SOLENOID (See Figure 14).

When Spacebands justify during all three quadding operations, it will mean the Justification Stop Solenoid has failed.

Instructions for replacing parts in the Quadder Housing and the Solenoid of the Justification Stop will be found below.

### REPLACEMENT OF PARTS ON SWITCH AND SOLENOID FRAME

(See Figures 10 and 13, Pages 10 and 19)

Remove the two lower screws (16) on both sides of the Quadder Housing. Raise the Sliding Block and Actuating Slide together, using both

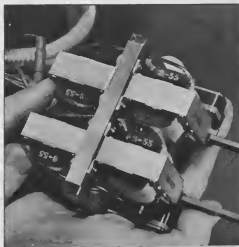


FIGURE 13

hands to make lifting easier, and slide out the Switch and Solenoid Block.

The Switches are held in place by an L-shaped bracket held on the frame by one screw. Solenoids are replaced easily by removing the four screws holding them in place.

Replace the Block with wires carefully tucked between the Solenoids in back to prevent pinching against the Housing.

### REPLACEMENT OF JUSTIFICATION STOP SOLENOID (See Figure 14).

Remove the Guard. Pull apart the snap connections holding the wire leads together and replace the Solenoid.

### IF MACHINE FAILS TO JUSTIFY

(See Figure 5)

The principal reasons for failure of justification are the misadjustment of the Short Line Device, or failure of the switch in the Device.

The Star Selectro-Matic Quadder is provided with an automatic quadding feature for short

lines—lines less than full by a pre-set distance. This distance is adjustable from 0 to 4 picas.

For example, if you are setting lines which range under 12 picas in length, you would set the indicator adjusting knob (2) at  $2\frac{1}{2}$ . As the line of matrices is assembled, the pointer (6) in front of the assembler slide indicating bar (7) moves forward. When this pointer reaches  $2\frac{1}{2}$  or less on the scale, the line will justify. If the space left is more than  $2\frac{1}{2}$  picas, the line will quad automatically.

The line may fail to cast, however, if there are not enough spacebands in the line, even though it is apparently full to the indicated



FIGURE 14

point. In other words, this is considered a loose line as on any normal machine, and the automatic pump stop safety takes over to prevent a squirt.

The rule for setting the short line device is this: On short measures, use the lower numbered settings; on long measures use the higher numbers. When set at "0", all lines will quad.

### HOW IT OPERATES

On the bracket (1) which holds the adjusting knob (2) is the microswitch trip rod (3). As the line fills out this rod goes over the roller (4) on the microswitch assembly (19) and depresses the button of the microswitch (5) underneath it. This cancels all quadder signals and the line will justify. If the line is short of the limit set, it will automatically quad in the direction indicated by the quad button depressed.

See the Adjustment Section, pages 4 and 5 for detailed method of adjusting the Short Line Device.

## TAPE OPERATION

The Star Selectro-Matic Quadder is basically the same for tape operation as for manual operation. The changes are as follows: Two relays, No. Q-735, are inserted in the memory box, replacing the two plugs on non-tape operated quadders. These relays receive a signal or signals from the tape either through the bail switches on TTS units or directly from the AutoSetter unit.

The memory transfer box for tape operated machines is described on page 12, and contains three micro-switches instead of two. The purpose of the third switch is to clear the primary or first stage relays which receive their signals from the tape.

There are two systems used for quad left, right, or center signals. During the reading of the quadding signals on TTS units, the bail switches under the TTS unit make contact, transferring the desired signal into an electrical impulse which is transmitted to either or both first stage relays in the quadder memory box. This function selects the quadding signal much the same as manually pressing the selector button for quadding operations on a manually operated machine.

Center is obtained by signal 02345 operating bail switch No. 4, while left flush is obtained by signal 0134 operating bail switch No. 5 on either type unit. On the earlier units, code 01234 operates bail switches Nos. 1 and 2 resulting in a flush right signal. On later units, signals 0134 and 02345 operate bail switches Nos. 4 and 5 for flush right signals.

Closing of the bail switches as indicated from a tape signal energize the first stage relays as the line is elevated. The memory transfer unit transfers the signal from the first stage relays to the proper second stage relays. As the assembling elevator returns to its normal position, the first stage relays are cleared by the third switch in the memory transfer box, ready to receive the next quadding function from tape.

To check the operation from tape, be sure the proper signals are perforated in the tape. Verify that the proper bail switches are closing, that the contacts are clean, and that the three-prong relays (first stage) are closed when the bail switch makes contact. To test—perforate

the quadder signals in the tape, turn the TTS operating unit by hand, and note the action of the bail switches as shown in the following chart:

PRESENT SYSTEM		
TAPE CODES	QUAD	BAIL SWITCH
02345	Center	4
0134	Left Flush	5
02345 & 0134	Right Flush	4 & 5
EARLY SYSTEM		
01234	Right Flush	1 & 2
02345	Center	4
0134	Left Flush	5

### AUTOSETTER OPERATION

The same signals are used to determine quadder functions as above mentioned. The AutoSetter does not use bail switches; the sealed-type relays in the AutoSetter operate from tape, transferring their signals directly to the first stage relays in the quadder memory box. Check by same procedure, noting action of the relays when quadding signals are tested through the tape reader.

### USE OF THE SELECTOR BOX AND SHORT-LINE SWITCH

It is suggested the short line switch be set  $1\frac{1}{2}$  or 2 and the left flush selector button be depressed. By this arrangement, it is not necessary to signal widow lines as they will flush left automatically.

**IMPORTANT**—Quadder signals punched in tape will be obtained regardless of setting of short line switch.

When the selector box push-button is depressed for center, all lines will center regardless of quadder signals from the tape. The short-line switch will cancel the center signal and all widow lines will center, regardless of quadder signals on the tape.

The switch on the side of the selector assembly should be in "QUAD" position for tape operation. Note: On early quadders it should be in "TTS" position.

### TROUBLE-SHOOTING—TAPE OPERATION

The following are the most common problems associated with the tape operation of the Star Quadder:

- 1—Unit not reading the tape signals for quadding. Check the operating unit to see that the bail switches are closing when

the signal appears on the tape. (This is an operating unit problem).

- 2—First stage relays not accepting quadding signals. Cause—Dirty contacts in ball switches, defective relay, or loose plugs.
- 3—Premature clearing of first stage relays. Check third micro-switch in memory transfer unit for defective or incorrectly adjusted switch, or lack of complete actuating rod motion.
- 4—Failure of signal to transfer from first

stage to second stage relays.

- 5—Quadder misses signals when "hanging the elevator" but is correct at all other times. Solution—Adjust TTS unit to delay raising of the elevator until delivery slide is in correct position. For AutoSetter: Adjust magnet on delivery lever shaft so the delivery slide short finger is  $\frac{1}{2}$ " or less from the spaceband chute.

# SELECTO-MATIC QUADDER WIRING DIAGRAM

